action can take place between the solids in contact (*Compt. rend.* xciii. 1074).

IN the *Berichte* (xv. 109) Brauner describes some new compounds of the cerium metals, especially *Cerium tetrafluoride*, CeF_4, and didymium pentoxide, Di_2O_5; he also gives data whence he deduces the value 146·5 for the atomic weight of didymium. Brauner likewise discusses the grouping of these metals in accordance with the "periodic law," and shows that didymium may fairly be placed as the eighth member of group V., the members of which group form pentoxides, M_2O_5 (see also *Chem. Soc. Journal*, Trans. 1882, p. 68).

VARIOUS new salts analogous to the ferrocyanides and ferricyanides are described by Descamps (*Ann. Chim. Phys.* [5] xxiv. 178), chiefly *mangano-* and *mangani-cyanides*, *cobalto-cyanides*, and *chromo-cyanides*.

FROM experiments on the action of sulphur dioxide on nitric oxide, Lunge concludes that, when water is present, sulphur dioxide partially reduces the higher oxides of nitrogen to nitrous oxide, even in presence of free oxygen (*Berichte*, xiv. 2196). These results of Lunge's have a direct bearing on the changes which proceed in the chambers of the sulphuric acid manufacturer.

THE synthetical production of urea, by passing air charged with ammonia and benzene over hot spirals of platinum wire, is described by E. F. Herroun in *Chem. Soc. Journ.* Heated spongy platinum, or platinised asbestos, caused a large production of ammonium carbonate with little urea; platinised charcoal caused the production of much urea, but the action proceeded more slowly than when spirals of platinum wire were employed.

FROM results of series of measurements, the following general statement regarding fractional distillation is made by F. D. Brown (*Chem. Soc. Journ.*). "In distillations with a still-head maintained at a constant temperature, the composition of the distillate is constant, and is identical with that of the vapour evolved by a mixture whose boiling-point equals the temperature of the still-head." Brown thinks that the reciprocity between a liquid mixture and the gaseous mixture evolved by it on ebullition has been too much neglected in reasonings about fractional distillation.

THE explosion of fulminate of mercury has been studied by Berthelot and Vieille (*Ann. Chim. Phys.*). The chemical change which occurs when this salt is exploded is a simple one, thus: $C_2HgN_2O_2 = 2CO + N_2 + Hg$; the heat produced, at constant pressure, per gram-molecule, is sufficient to raise the temperature of the products of explosion (supposing these already gaseous) to about 4200°. The local action exerted when the fulminate is exploded in a closed vessel is more violent than with other explosives, but the total pressure is only about three-fourths of that produced by dynamite or nitro-glycerine. The instantaneous nature of the explosion of fulminate, the almost complete absence of dissociation of the products, and the high specific gravity of the material, conspire to render the explosion of this substance very effective.

ACCORDING to M. Amagat (*Compt. rend.*) pure dry oxygen exerts no action on mercury even under pressure: this is opposed to the results obtained by Regnault.

FURTHER observations bearing on the relations existing between molecular structure and the absorption spectra of carbon compounds are described by Hartley (*Chem. Soc. Journ.*, Trans., p. 45), who concludes that "the simple union of carbon to nitrogen does not cause selective absorption of the ultra-violet rays." This conclusion is aplied to a discussion of the structural formulæ of several compounds, more especially of *cyanuric acid*, the molecule of which appears to possess "a nucleus with a compactness of structure intermediate between that of benzene hexchloride and that of benzene."

EXPERIMENTS by Remsen and Hall (*Amer. Chem. Journ.* ii. 50) on the oxidation of *sulphamine-para-toluic acid* confirm the general statement that when, in a derivative of an aromatic hydrocarbon, one of the substituting groups is electronegative, this negative group exerts a *protective influence* on the other group during oxidation.

VARIOUS papers on the cinchona alkaloids have recently been published: two new alkaloids are described, one by Arnaud, under the name of *cinchonamine* (*Compt. rend.* xciii. 593), the other—*homoquinine*—by Howard and Hodgkin (*Chem. Soc. Journ.*, Trans., 1882, p. 66). Both alkaloids are found in bark from Santander, Columbia, described by Flückiger as *China cuprea*. The structural formulæ of *quinoline*, *quinic*, and *quinuric acids*, are discussed at length by Skraup (*Monatshefte für Chemie*, ii. 587). Various sulphuric derivatives of cinchonine are described by Weidel (same journal, p. 565), and papers of importance, although too technical for detailed notice here, on cinchonine and the so-called homocinchonine, by Koenigs, Hesse, and Claus, appear in the *Berichte* (xiv. 1852, 1888, 1890, and 1921).

REINCKE states (*Berichte*, xiv. 2144) that he has obtained aldehydic substances from the juices of chlorophyll containing plants. The formation of these substances appears to depend on the action of sunlight. Reincke thinks that formic aldehyde is present as the most active among these reducing substances, but he does not support this supposition by experimental evidence.

HERREN GOLDSCHMIDT and V. Meyer describe a modification of the well-known apparatus of the latter chemist for determining the specific gravities of gases. The apparatus is filled with dry air, and heated to the temperature at which the determination is to be made; the air is then driven out by a stream of hydrochloric acid, received in a graduated tube standing over water, and measured: the gas under examination is passed into the apparatus, heated, and driven out by dry air into weighed potash-bulbs containing a liquid which will absorb the gas. In this way the weight of the gas is obtained; the volume of air gives the volume of this weight of gas at the observed temperature. The apparatus may also be used as an air-thermometer (*Berichte*, xv. 137).

NOTES FROM THE OTAGO UNIVERSITY MUSEUM

II.—*On the Skeleton of Notornis Mantelli*[1]

HITHERTO the rare flightless rail, *Notornis Mantelli*—the Takahe of the Maoris—has been known only by the two skins now in the British Museum, and by a few fossil bones, found associated with remains of *Dinornis*, *Aptornis*, &c.

Quite recently a third specimen was killed on the eastern shores of Lake Te Anau, and the finder, Mr. J. Connor, not only removed and preserved the skin, but, most fortunately, retained as well the roughly-cleaned skeleton of the trunk. With Mr. Connor's permission, I have prepared a description and drawings of the more important parts of this unique specimen, which is now, with the skin, on its way to England for sale.[2]

The skeleton, consisting as it does, of the parts saved after skinning, is *minus* the skull and anterior cervical vertebræ, the wing-bones, the bones of the legs with the exception of the femora, and the posterior caudal vertebræ. It is in very good preservation, with the exception of the ribs and the femur on the right side, which are shattered, probably by shot, and the right side of the middle xiphoid process of the sternum, which is slightly cut, apparently during skinning.

The more important measurements are as follows:—

	cm.
Length of trunk, measured from the anterior (dorsal) ends of the coracoids to the posterior end of the pelvis ...	18·5
Length of scapula	8·0
,, coracoid	4·2
,, sternum	6·8
Width of sternum, measured just posterior to the coracoid grooves	4·3
Depth of carina sterni	0·9
Length of ilium	10·4
Width of pelvis at posterior border of acetabula	5·6
Length of femur	10·3

In the vertebral column the nine posterior cervical vertebræ are

[1] Abstract of a paper read before the Otago Institute on September 21, and to be published in the next (13th) volume of the *Transactions* of the New Zealand Institute.

[2] It was much to be regretted that the funds of this Museum did not allow of the purchase of these specimens and their retention in New Zealand. But by the kindness of two ladies, Miss F. M. Wimperis and Miss Maud McLaren, the Museum now possesses the next best thing to the actual specimen, namely, two life-sized oil paintings, executed with a fidelity and artistic skill which leave nothing to be desired. I was the more glad to obtain these pictures, as the Te Anau specimen differs in many details of colouring from the British Museum examples, notably in the absence of the broad black band on the neck and of the crescentic markings on the wing-coverts.

left; there are seven pre-sacral thoracic vertebræ, free save for a union of their several spines by ossified ligaments; the com-

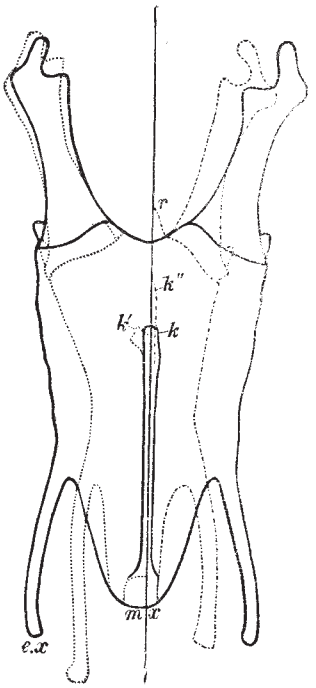

FIG. 1.—Ventral aspect of the sternum and coracoids of *Notornis*, three-fourths natural size (continuous outline); on the left are shown the corresponding bones of *Ocydromus* (dotted outline), on the right those of *Porphyrio* (broken outline), both reduced to the same absolute length of sternum as *Notornis*. *m.x.*, middle xiphoid process; *e.x.*, external xiphoid process; *r*, rostrum of sternum (*Porphyrio*); *k*, point of keel of sternum of *Notornis*, *k'*, of *Ocydromus*, *k''*, of *Porphyrio*.

pound "sacrum" contains one thoracic, five lumbar, four sacral, and six caudal vertebræ. I give no detailed description of the

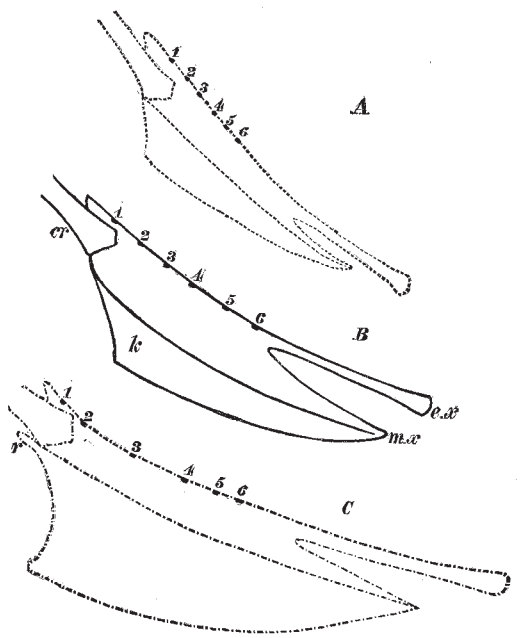

FIG. 2.—The sternum of *Ocydromus* (A), *Notornis* (B), and *Porphyrio* (C), viewed from the left side, and all reduced to the same absolute length of trunk. *cr*, coracoid; *m.x.*, middle, and *e.x.*, external xiphoid process; *r*, rostrum; *k*, keel; 1–6, places of articulation of sternal ribs.

vertebral column, as I could not have it disarticulated; it was, however, quite evident that there was no difference of any importance between the vertebræ of *Notornis* and those of its nearest New Zealand allies, *Porphyrio* and *Ocydromus*.

Of the eight thoracic ribs six are united to the sternum; four of these—the second to the fifth—have uncinate processes, which have a similar position to those of *Ocydromus*, being situated nearer the sternal ends of the ribs than in *Porphyrio*. The penultimate cervical rib is short and stout, quite like that of *Ocydromus*.

The sternum and shoulder girdle and the pelvis are best described by comparing them, point for point, with those of the two allied genera; I am unfortunately not able to include *Tribonyx* in the comparison, as I have not yet succeeded in ob-

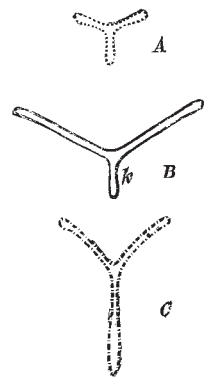

FIG. 3.—Transverse section of sternum of *Ocydromus* (A), *Notornis* (B), and *Porphyrio* (C), showing transverse sternal angle and depth of keel (*k*); three-fourths nat. size.

taining a skeleton of it. It is convenient to study the relative sizes and proportions of the bones by reducing the three skeletons to the same absolute length of trunk, as measured from a point midway between the anterior or dorsal extremities of the coracoids to one midway between the posterior extremities of the pubes. The proportions of the individual bones, considered separately or without reference to the rest of the skeleton may be studied by reducing the corresponding bones in the three genera to the same absolute length.

In all the figures the bones of *Notornis* are drawn with a continuous outline, those of *Ocydromus* with a dotted, and those of *Porphyrio* with a broken outline. In each case also the bones of

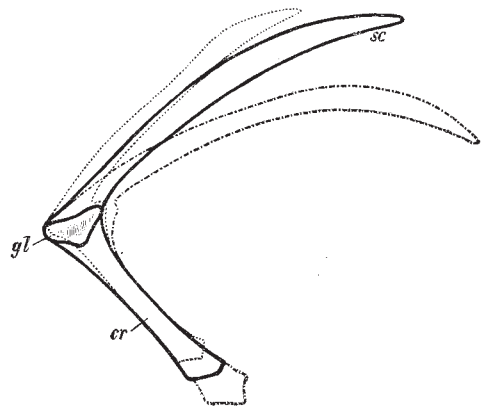

FIG. 4.—Scapula and coracoid of *Notornis* (continuous outline), *Ocydromus* (dotted outline), and *Porphyrio* broken (outline), all drawn to same absolute length of trunk. *cr*, coracoid; *sc*, scapula; *gl*, glenoid cavity.

Notornis are three-fourths the natural size, those of *Ocydromus* and *Porphyrio* being reduced either to a common length with those of *Notornis* (Figs. 1 and 7), or so as to correspond with a common length of trunk (Figs. 2, 4, 5, and 6).

The sternum of *Notornis* (Fig. 1) is broad and flat, at its anterior end it closely resembles that of *Ocydromus*, having a precisely similar emargination and being devoid of the rostrum (*r*) present in *Porphyrio*; on the other hand, it diminishes very gradually in width from the anterior to the posterior end, and has very divergent external xiphoid processus (*e.x.*); the middle xiphoid (*m.x.*) is blunt and unossified. Relatively to the trunk

the sternum is about intermediate in size between those of *Ocydromus* and *Porphyrio* (Fig. 2). The keel is shallow, like that of *Ocydromus*, having very nearly the same depth proportionally to length of trunk (see table of comparative measurements below); its anterior edge has nothing of the strong forward curvature seen in *Porphyrio*. The lateral curvature of the

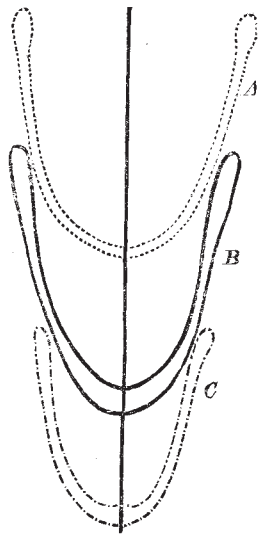

FIG. 5.—Furcula of *Ocydromus* (A), *Notornis* (B), and *Porphyrio* (C), drawn to same absolute length of trunk.

sternum is very slight, its two sides inclosing a dihedral angle—the *transverse sternal angle*, as it may be called—which is very nearly as open as that of *Ocydromus*, and many degrees greater than that of *Porphyrio* (Fig. 3).

In the shoulder-girdle both coracoid and scapula are about intermediate in proportional size between those of the two allied

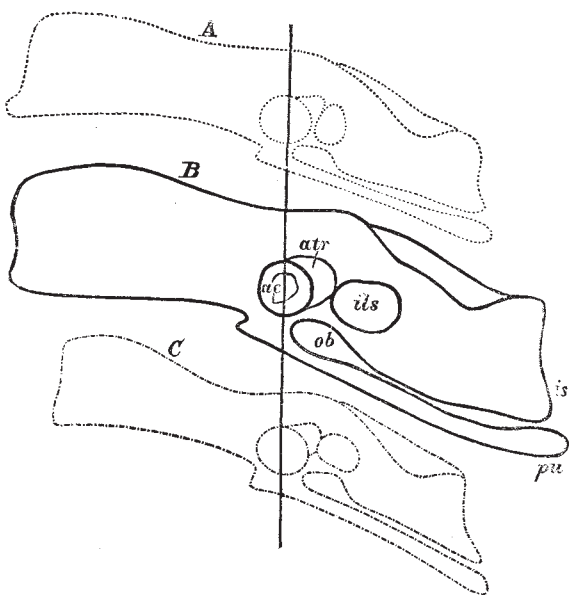

FIG. 6.—Side views of pelvis of *Ocydromus* (A), *Notornis* (B), and *Porphyrio* (C), drawn to same absolute length of trunk. *ac*, acetabulum; *atr*, anti trochanter; *ils*, ilio-sciatic foramen; *ob*, obturator notch; *is*, ischium *pu*, pubis.

genera (Fig. 4). The same is the case with regard to the curvature of the scapula, and the angle inclosed between it and the coracoid—the *coraco-scapular angle*—which in *Nortornis*, as in *Ocydromus*, is greater than a right angle. In this, as in other characters of the shoulder-girdle, *Notornis*, although intermediate between its two allies, approaches most nearly to *Ocydromus*.

The same is true of the furcula (Fig. 5), which is less markedly U-shaped than that of *Ocydromus*, more so than that of *Porphyrio*. It is a very slender bone; the apparent thickness of its median portion in the figure is due to its being flattened in that region from before backwards.

In the pelvis intermediate characters are no longer found, the heavy cursorial *Notornis* having a pelvis of considerably greater proportional dimensions than either of its allies (Fig. 6). Both in vertical height, and in length the pelvis is proportionally markedly larger than in *Ocydromus*, and very considerably larger than in *Porphyrio*. In the relative proportions of the pre- and post-acetabular portions of the ilium, *Notornis* most nearly approaches *Porphyrio*: in the outline of the ilium, as seen from the dorsal side (Fig. 7), it more nearly resembles *Ocydromus*. The excess in size of the pelvis of *Notornis* is most marked in its transverse dimensions, as seen in Fig. 7, where the three pelves are drawn to the same absolute length of sacrum. The ischia and pubes of *Notornis* are widely separated, so much so that the

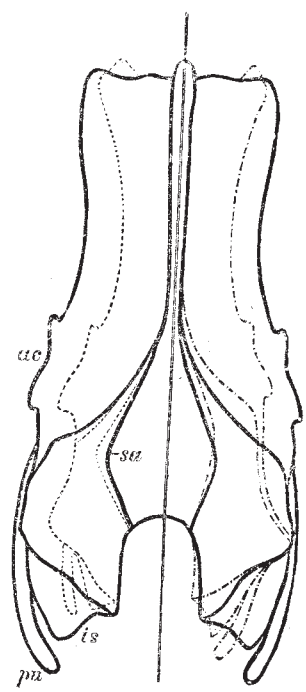

FIG. 7.—Dorsal view of the pelvis of *Notornis* (continuous line) with on the left that of *Ocydromus* (dotted line), and on the right that of *Porphyrio* (interrupted line), all drawn to same absolute length of sacrum. *ac*, acetabulum; *sa*, lateral boundary of sacrum; *is*, ischium; *pu*, pubis.

greater part of the pubis can be seen in a dorsal view (Fig. 7); in the other two genera these bones fall well within the outer boundary of the ilium.

The following table gives the comparative dimensions of the three skeletons:—

Length of Trunk, measured as above = 100

	Ocydromus.	*Notornis.*	*Porphyrio.*
Length of sternum	28	36	40
Width of ,, measured just posterior to coracoid grooves	14	24	17
Depth of keel of sternum ...	4·7	4·8	13
Length of scapula	35	43	49
,, coracoid	20	22	28
,, ilium	49	56	43
Width of ,, at posterior border of acetabulum	21	29	21
Length of femur	51	57	51
Coraco-scapular angle	100°	97°	86°
Transverse sternal angle	141°	132°	96°

T. JEFFERY PARKER

Dunedin, New Zealand, November 9, 1881